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WHAT IS CLAIMED IS:

1. An optical amplifying device for amplifying an input optical signal, said device comprising:
light-emitting means for transmitting said input optical signal and emitting, based on said optical signal transmitted by said light-emitting means, a dummy optical signal having a waveform obtained by inverting a waveform of said input optical signal and having a wavelength that is different from a wavelength of said input optical signal;
control means for controlling the wavelength of said dummy optical signal emitted from said light-emitting means;
amplifying means for amplifying said optical signal and said dummy optical signal transmitted from said light-emitting means; and
separating means for separating said input optical signal from an optical signal after amplification.
2. The optical amplifying device according to claim 1, wherein
said dummy optical signal is equal in amplitude to said input optical signal.
3. The optical amplifying device according to claim 1, wherein
said control means controls the wavelength and an amplitude of said dummy optical signal emitted from said light-emitting means.
4. The optical amplifying device according to claim 1, wherein
said separating means separates said input optical signal and said dummy optical signal individually.
5. The optical amplifying device according to claim 4, wherein
said control means carries out feedback control of said light-emitting means based on the dummy optical signal separated by said separating means.
6. The optical amplifying device according to claim 4, wherein

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said control means controls the wavelength and an amplitude of said dummy optical signal emitted from said light-emitting means, and carries out feedback control of said light-emitting means based on the dummy optical signal separated by said separating means.

7. The optical amplifying device according to claim 1, wherein
said separating means collectively separates said input optical signal and said dummy optical signal.

8. The optical amplifying device according to claim 7, wherein
said separating means is an optical router with an AWG (Arrayed Wave Guide) structure.

9. The optical amplifying device according to claim 1, wherein
said light-emitting means is a distributed Bragg reflector (DBR) type semiconductor laser.

10. The optical amplifying device according to claim 1, wherein
said input optical signal is a burst optical signal.

11. An optical amplifying method for amplifying an input optical signal, said method comprising
the steps of:

transmitting said input optical signal, and emitting, based on said transmitted input optical signal, a dummy optical signal having a waveform obtained by inverting a waveform of said input optical signal and having a wavelength that is different from a wavelength of said input optical signal;

collectively amplifying said transmitted input optical signal and said emitted dummy optical signal; and

separating said input optical signal from an optical signal after amplification.

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